Traffic <u>Op</u>erations <u>S</u>trategies Implementation Report



California Department of Transportation — District 7 Traffic Operations Strategies (TOPS) Unit



Traffic Operations Strategies Implementation Report







APPROVAL RECOMMENDED:

Original Signed By: Frank Quon_

Frank Quon
Deputy Director
Division of Operations

2/13/02

Date

APPROVED:

Original Signed By: Robert Sassamann

Robert Sassaman District Director District 7, Los Angeles and Ventura Counties 2/19/02

Date

Prepared By:
Andrew Yoon
Yu-Ying Chu
Paul Chow
Joseph Reynoza
Elpidio Delos Reyes

With the special technical assistance of:

Jacqueline Tan

Tadeo Lau

Frank Lu

Traffic Operations Strategies Implementation Report

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EXECUTIVE SUMMARY

This Traffic Operations Strategies (TOPS) Implementation Report (Report) has been prepared in response to the development of a statewide plan for the State of California Department of Transportation (Department) to improve the overall operation of the State transportation system. This effort is highly consistent and complimentary with the Governor's Traffic Congestion Relief Program (TCRP), where the Governor has committed over \$8 billion toward transportation improvements that will ease traffic congestion. This Report presents an implementation plan that is consistent with the TOPS as described below.

- TOPS represent an operation-centered approach that produces significant benefits for relatively small costs compared to traditional State Transportation Improvement Program (STIP) projects.
- TOPS address congestion problems by utilizing all available tools to effectively operate the State freeway system at maximum efficiency through better system management, especially on the congested corridors.
- TOPS address all modes of transportation and the demand side of transportation in a comprehensive manner. TOPS will also work as a team with local agencies to make the arterial system an attractive alternative to the freeway system. Such local agencies include, but are not limited to, the Southern California Association of Governments (SCAG), Los Angeles County Metropolitan Transportation Authority (MTA), and Ventura County Transportation Commission (VCTC).
- TOPS focus on four elements: completing the intelligence component of the highway system, mitigating bottlenecks at on-ramps, off-ramps, or along the system, achieving high occupancy vehicle (HOV) gap closure, and modifying freeway-to-freeway interchanges.

The overall goal of TOPS is to reduce congestion by implementing sound traffic engineering techniques that keep freeways operating at peak efficiency. This means aggressively working to overcome choke point locations along the system that severely reduce speed and hamper efficiency of these corridor facilities by as much as 50 percent.

The implementation plan also identifies the need for additional intelligence components to complete the surveillance, detection, and verification infrastructure. A prioritized list of projects that address the needs at highway bottlenecks and HOV lanes has also been prepared by District 7 TOPS Unit and included as part of this report (Attachment B).

With the amount of traffic congestion on the freeway system today and the continued increase in traffic volumes, an adverse effect will occur if nothing is done to counteract this trend. Building new facilities will address some of the traffic congestion, but funding and other constraints will not allow the Department to build new facilities to significantly alleviate this congestion. Therefore, the Department is challenged to make more efficient use of the existing system. When all elements are implemented as presented in this report, many benefits will be realized, including a decrease in traffic congestion, delay, accidents, and air pollution as well as an increase in trip predictability and a high benefit/cost ratio.

California Department of Transportation – District 7 Traffic <mark>Op</mark>erations <mark>S</mark>trategies (TOPS) Impl<mark>ementation Report</mark>

INTRODUCTION

year since 1995.

The California Department of Transportation (Department) – District 7 (District) is comprised of Los Angeles and Ventura counties. Los Angeles County has the largest urban freeway network in the State with 610 centerline miles of freeway. Ventura County has 88 centerline miles of freeway. The District accounts for over a third of the statewide congestion and has been experiencing congestion growth at a rate of approximately 3 percent per

With such a growth rate, the traffic on most of freeways in Los Angeles County is moving in an unfavorable operational condition. It is a common practice in transportation engineering to have those operational conditions within a

traffic stream represented in terms of a qualitative measure referred to as level of service (LOS). Each of six LOS levels (LOS A to LOS F) represents a range of operational conditions and the driver's perception of those conditions in terms of three performance measures: density, speed, and flow or volume. LOS A is typically described as a freeway segment with a density



of 11 passenger cars per mile per lane (pc/mi/ln), whereas LOS F is that with a density of more than 45 pc/mi/ln. Queuing and stop-and-start conditions are generally experienced at LOS F. The operational conditions drivers experience on most of the freeways in Los Angeles County are described as LOS F. Although the operational conditions for freeways in Ventura County are currently not as deteriorated, United States (US) Routes 101 and State Route 118 are currently operating at or near their capacities, or LOS E. The operational conditions will continue to deteriorate and, by the year 2010, almost one half of the freeways in Ventura County are projected to be operating at LOS E or F. Figures 1 and 2 depict the congested segments of the freeways in Los Angeles and surrounding counties during the A.M. and P.M. peak period, respectively.

On a typical weekday, motorists using the freeway system experience approximately 143,000 vehicle-hours of delay of recurrent congestion and an equal amount of delay of non-recurrent congestion. Recurrent congestion is associated with a traffic condition that occurs during the commute period when traffic demand exceeds freeway capacity. Non-recurrent congestion is



Snapshot of a corridor without congestion

associated with incidents, planned lane closures, or special events. Figure 3 illustrates current traffic congestion levels (as of November 2000) in the District and displays the locations of congested corridors according to the total delay experienced on that corridor.

Within the District, a TOPS Unit was established to identify heavily congested corridors, assess choke point locations, identify potential projects, and deliver project initiation documents (PID's) for TOPS projects. To date, several TOPS Project Study Reports (PSR's) have been approved and await funding. Preparation of PID's will allow

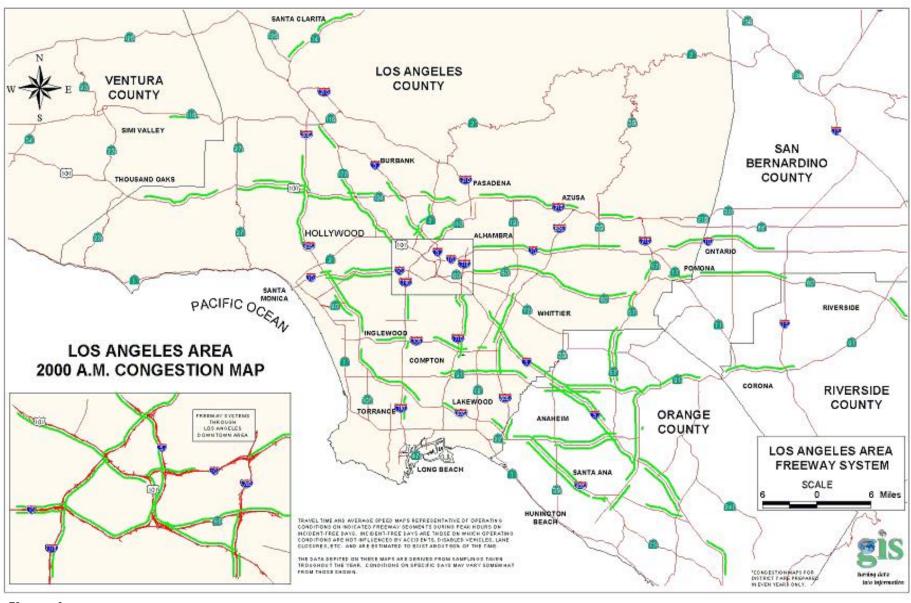


Figure 1.

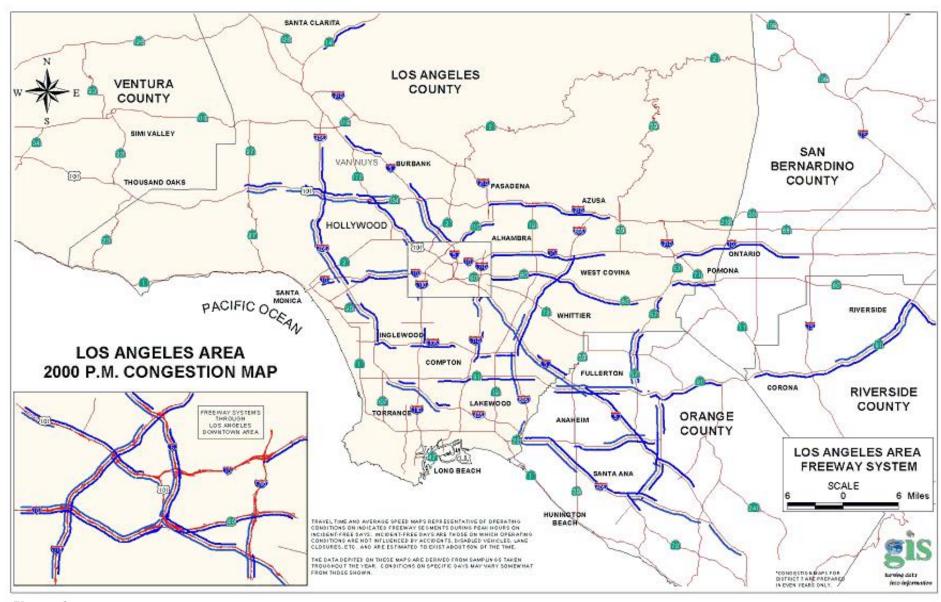


Figure 2.

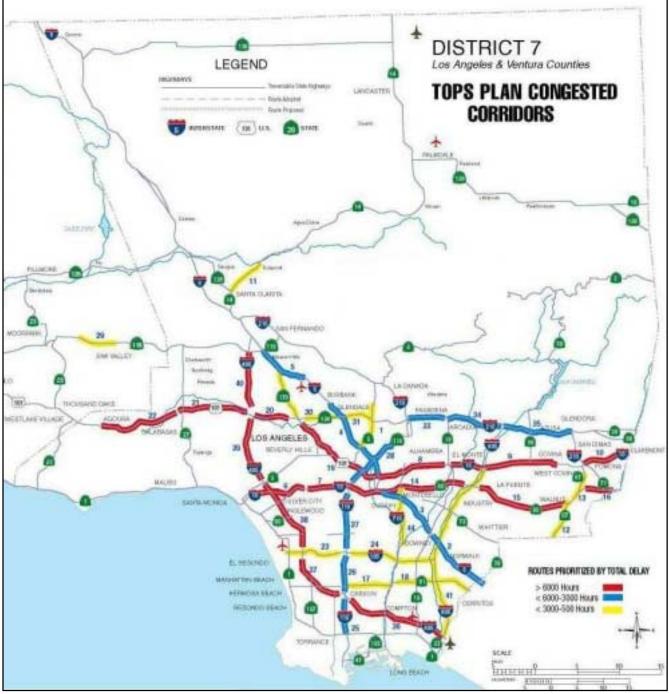


Figure 3.

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	COR- RIDOR	ROUTE	FROM	ТО	P.M.
	1	2	Rte 5	Rte 134	15.0-19.37
	2	5	PM 0.00	Rte 19	0.0-8.31
	3	5	Rte 19	Rte 101	8.31-16.9
	4	5	Rte 101	PM 30.0	16.9-30.0
	5	5	PM 33.0	Rte 118	33.0-39.39
	6	10	PM 3.5	PM 10.0	3.5-10.0
	7	10	PM 10	Rte 5/101	10.0-18.39
	8	10	Rte 5/101	Rte 19	18.39-27.0
	9	10	Rte 19	PM 40.0	27.0-40.0
	10	10	Rte 71	PM 48.0	42.44-48.0
	11	14	Rte 126	PM 36.0	27.05-36.0
	12	57	PM 0.0	Rte 60	0.0-4.50
	13	57	Rte 60	PM 7.0	4.5-7.0
	14	60	PM 0.0	Rte 605	0.0-11.71
	15	60	Rte 605	Rte 57S	11.71-23.56
	16	60	PM 25.46	PM 30.45	25.46-30.45
	17	91	Rte 110	Rte 710	5.34-11.68
	18	91	Rte 710	Rte 20.44	11.68-20.44
	19	101	Rte 5/10	Rte 134E	0.0-11.75
	20	101	Rte 134E	Rte 405	11.75-17.15
	21	101	Rte 405	Rte 27	17.15-25.34
	22	101	Rte 27	PM 35.0	25.34-35.0
	23	105	Rte 1	Rte 110	0.50-7.39
	24	105	Rte 110	Rte 605	7.39-17.82
	25	110	Rte 1	Rte 91	4.06-9.87
	26	110	Rte 91	Rte 105	9.87-13.82
	27	110	Rte 105	Rte 10	13.82-21.44
HF.	28	110	Rte 10	PM 30.0	21.44-30.0
	29	118	ERRINGER	COCHRAN	25.0-30.0
	30	134	Rte 170	Rte 5	0.0-5.5
	31	134	Rte 5	Rte 27	5.5-9.0
	32	170	Rte 134E	Rte 5	14.50-20.55
	33	210	Rte 134	Rte 164	24.96-29.5
	34	210	Rte 164	Rte 605	29.5-36.4
	35	210	Rte 605	Rte 30E	36.4-44.4
	36	405	PM 0.0	Rte 110	0.0-12.12
	37	405	Rte 110	Rte 105	12.97-21.18
	38	405	Rte 105	Rte 2	21.18-30.87
	39	405	Rte 2	Rte 101	30.87-39.5
	40	405	Rte 101	Rte 118	39.5-46.8
	41	605	PM 0.0	Rte 105	0.0-7.85
2	42	605	Rte 105	Rte 72	7.85-13.67
	43	605	Rte 72	Rte 10	13.57-20.19
	44	710	Rte 105	Rte 60	15.70-24.63

implementation of TOPS projects once funding is secured. This report presents a summary of activities completed by the District TOPS Unit and provides a strategic plan to implement various transportation strategies to reduce congestion and effectively manage and operate the freeway system at maximum efficiency.

IMPLEMENTATION OF TOPS

The District TOPS Unit applies various transportation strategies to keep freeway traffic flowing across Los Angeles and Ventura counties and to achieve the goals of the TOPS Program. To accomplish this, the District TOPS Unit employs four primary implementation elements that focus on augmenting the State Highway System. The four elements are briefly described below and further explained in the subsequent sections.

- Intelligent Infrastructure Completion of the "intelligence" component of our existing infrastructure will enhance the detection, verification, response to, and clearance of incidents on the State highways and, therefore, improve traffic flow and system management by the District.
- Physical Operational Improvements Improvements on existing infrastructure with physical operational limitations will alleviate choke points and increase overall traffic flow and, therefore, enhance overall safety and allow the existing transportation system to be fully utilized.
- High Occupancy Vehicle (HOV) Gap Closure Closure of all operational gaps in the HOV network will eliminate traffic disruptions at the termini of HOV lanes and, therefore, allow more efficient usage of the existing HOV network.
- <u>Freeway Interchange Modifications</u> Operational modifications on the existing freeway interchanges will allow more efficient traffic flows and, therefore, result in less traffic congestion.

A fifth element of TOPS implementation is to raise more funding, coordinate and partner with regional and local transportation agencies, and encourage integration with other modes. The TOPS Unit is continuously seeking various funding resources that may include Congestion Mitigation and Air Quality Improvement (CMAQ) Contingency Funds and the Regional Share of Surface Transportation Program (RSTP) Contingency Funds.

The four primary TOPS implementation elements are categorized into three levels of potential investments as indicated below, depending on the complexity and magnitude of projects each element requires.

- Level 1 Investments Investments of this level focus on relieving congestion at choke points through minor operational improvements and include those in intelligent infrastructure and physical operational improvements.
- <u>Level 2 Investments</u> Investments of this level increase HOV capacity and enhance the operation of the existing HOV network and include those in the HOV network gap closure.
- Level 3 Investments Investments of this level includes major operational improvement, including those in freeway interchange modifications.

The TOPS Unit has mainly concentrated its activities on implementing the first level projects. These projects involve little or no environmental impact, have quick project delivery and construction turnarounds, and are lower in cost. However, as the TOPS Unit identifies more funding resources and more funds become available, the second and third levels of projects will also be implemented. All funding opportunities are being explored to fund all three levels. Examples of representative TOPS projects are as follows:

Level 1 – Intelligent Infrastructure

Changeable Message Signs (CMS's), closed-circuit televisions (CCTV's), communication links, fiber optics, Highway Advisory Radios (HAR's), ramp/connector metering and metering control, signal upgrades, traffic monitoring stations, Transportation Management Center (TMC) upgrades, Freeway Service Patrol (FSP), surveillance stations, and traveler information system

<u>Level 1 – Physical Operational Improvements</u>

Roadway alignment upgrades, auxiliary lanes, intersection upgrades, lane/shoulder widening, passing lanes, and ramp modifications

Snapshots of HOV or freeway

Level 2 – HOV Gap Closure

HOV gap closures, HOV connectors, HOV drop ramps, and other improvements on HOV/managed lanes

Level 3 – Freeway Interchange Modifications
 Freeway connectors and interchange improvements.

Initial estimates demonstrate that the TOPS projects are cost-effective investments that provide greater returns than do typical system expansion projects. The total benefit/cost ratio for the first level of TOPS investments is more than triple that of the average roadway expansion project. The Department and District 7 strongly believe in the merits of TOPS and will work closely with its partners to implement them.

INTELLIGENT INFRASTRUCTURE



New communications technology, better monitoring tools, and new control equipment can create an "intelligent infrastructure" that allows for optimal system management and routing of travelers to their desired destinations. Sample investments include System-Wide Adaptive Ramp Metering (SWARM), CMS's, HAR, CCTV, TMC, incident detection, verification and response systems, Advanced Traveler Information

Systems (ATIS), and real-time performance measurements. These improvements provide the capacity for accurate and focused performance measurement, resulting in the real-time feedback necessary to maximize the performance of the existing system.

The Department has deployed intelligent infrastructure elements over the last two decades, and most notably in District 7. However, TOPS require that additional investments in these components be made to fully instrument the State Highway System. The District has diligently implemented the intelligent infrastructure elements and currently has approximately 300 miles of fully instrumented freeways. In addition, more than \$62 million has been programmed for investment in the deployment of additional intelligence components for the next several years as indicated in the State Highway Operation Protection Program (SHOPP) project list included in Attachment A.

The status of existing and proposed intelligence components within the District is illustrated in Figure 4 and summarized in the table below. This figure also depicts the configuration of Advanced Transportation Management Systems (ATMS) utilizing the intelligence components. Descriptions of several intelligence components follow the table below.

STATUS OF EXISTING AND PLANNED FACILITIES (AS OF APRIL 19, 2001)

Elements	Existing	Plan/Design/Construction Phase	Total
CMS	104	75	179
CCTV Cameras	323	282	605
HAR	23	17	40
Ramp Meters	838	625	1463
Connector Meters	4	4	8
Fiber Optics (miles)	420	420.4	840
Response Team	9	NA	9
FSP (directional miles)	439	NA	439
Surveillance Stations	1100	NA	1100

NA – Data Not Available

A. Changeable Message Sign or CMS



Some of these non-intrusive projects involve adding electronic CMS's to existing freeways. These electronic informational message signs are installed near major interchanges for the purpose of advising commuters of problems or detours early enough, so that travel changes may be made to avoid a heavily congested area.

B. Closed Circuit Television or CCTV

Other congestion relief tools include installing more CCTV cameras overlooking major freeways. The CCTV cameras provide real time traffic information because they allow the Department and the California Highway Patrol (CHP) to monitor freeway conditions from the TMC in the District office on a second by second basis. The CCTV cameras are installed at various locations of freeways within the District and are used to identify and verify areas of distress or potential problems.

a d CAT 504 892

CCTV snapshot of westbound Interstate Route 10

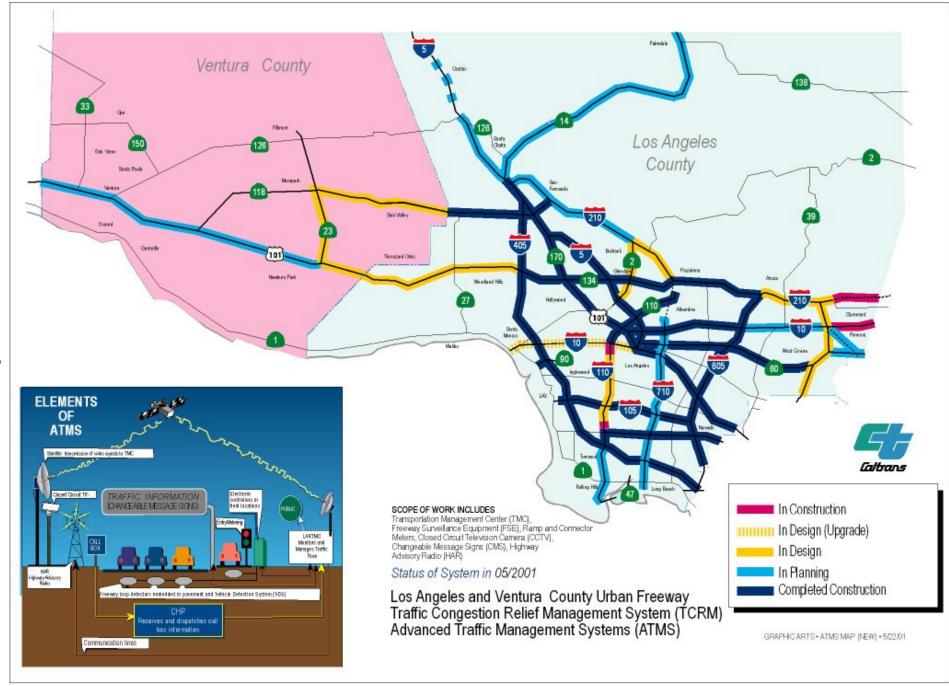


Figure 4.

The installation of CCTV cameras throughout the freeways within the District has enabled the Department and CHP to make quick and responsive decisions on the fly, verify and clear incidents, deploy appropriate resources, and manage heavy congestion and incidents.

C. Highway Advisory Radio or HAR

HAR stations also help motorists make travel decisions before entering major freeway corridors or construction zones. These special "low or high band" radio stations provide highway conditions or project updates including detours within the desired area. Signs noting these stations are posted adjacent to freeways. The Department believes that motorists are in a better position to plan or alter their trips and avoid congestion by keeping informed about traffic conditions and any possible road restrictions or detours whenever possible. HAR stations also serve to keep motorists informed of areas where weather is inclement.

D. Ramp and Connector Metering

Snapshots of metered ramps on

Interstate Routes 405 and 10.

Ramp metering and freeway-to-freeway connector metering also help to decrease congestion because they stagger vehicle entry onto a freeway and/or an interchange. The ramp metering provides a safer and restricted means of vehicle entry and merging in a freeway, rather than allowing several vehicles

to merge into traffic in an uncontrolled manner. The ramp metering also eliminates the opportunity for congestion that may otherwise exist when multiple vehicles compete for limited space in a freeway upon their entry. The freeway-to-freeway connector metering works in a similar way as the ramp metering. As of June 2001, there are 859 ramps and 21 freeway-to-freeway connectors that are metered in the District to help relieve congestion.

PHYSICAL OPERATIONAL IMPROVEMENTS

These improvements address choke points that are created by lane imbalances and existing capacity limitations. The Department has historically addressed these limitations on a project-by-project basis in a fiscally constrained environment as part of the SHOPP. The District has identified the projects necessary to address these deficiencies in the Los Angeles and Ventura counties as included in Attachment A. The locations of these projects are included in Figure A-1, following the list. Typical investment projects include the construction of freeway auxiliary lanes, the modification of ramp/city street access, freeway widening, and addition of acceleration and deceleration lane.

As a result of a "corridor" approach to planning, projects in this category have allowed motorists to take advantage of previously under-utilized capacity in our transportation system. Since these projects are smaller in scale, they can typically be implemented faster than larger infrastructure expansion projects.

The TOPS Unit has identified a multitude of candidate projects that will help alleviate congestion at choke points in the District. A list of the candidate projects is included in Attachment B. Figure B-1, following the list, displays the locations of the candidate projects.

The numbers noted on the figure correspond to the numbers in the table. As indicated in Figure B-1, to date, the total number of candidate projects identified by the TOPS Unit is 78.

HIGH OCCUPANCY VEHICLE (HOV) GAP CLOSURE

HOV lanes are provided in freeways exclusively for those who rideshare or other users that meet the vehicle code requirements for HOV usage. The HOV lanes help alleviate congestion and allow more efficient traveling (greater person volume/throughput) by diverting the eligible HOV's from mixed-flow (MF) lanes and minimizing competition for limited space in MF lanes.

Aerial picture of freeway-to-freeway HOV connector at Interstate Routes 110/105

HOV lanes in the District have been in operation since January 1973, with the Interstate Route 10 HOV lanes known as the El Monte Busway. With a stretch of approximately 11 miles in each direction, the El Monte Busway opened to traffic as an exclusive busway, and later allowed public

Busway opened to traffic as an exclusive busway, and later allowed public carpool traffic. With a current peak hour volume of approximately 1327 vehicles, the El Monte Busway has not only demonstrated the value of the District HOV program, but also benefited the public by accommodating over 80 buses and carrying as many people as three regular traffic lanes on the Interstate Route 10 during the peak hours.

Since the success demonstrated by the operation of the El Monte Busway, the Department has invested in the HOV program and constructed approximately 964 HOV lane miles statewide, of which 377 lane miles exist in Los Angeles County. Approximately 145 additional centerline miles of HOV lanes are currently in planning, design, or construction phases within the District. The status of existing and proposed HOV systems in Los Angeles County and the southern California region of five counties (Los Angeles, Ventura, Orange, San Bernardino, and Riverside) is illustrated in Figures 5 and 6, respectively.

Merging from HOV lanes to MF lanes, or vice versa, creates conflict and traffic delays that may affect motorists many miles away. TOPS plans to link existing and future HOV lanes, filling any gaps and building direct freeway-to-freeway HOV connectors to create a fully connected HOV network. Potential investments to address these problems include the construction of drop ramps, freeway-to-freeway HOV connectors, and HOV gaps that exist within corridors. These projects will incorporate strategies to alleviate the need for HOV's to cross MF lanes. In addition, these projects will benefit future bus rapid transit systems and provide greater people-moving capacity on the system.

FREEWAY INTERCHANGE MODIFICATIONS

These modifications generally include re-routing of merging traffic beyond the intersection point and extend auxiliary lanes between and through the interchanges. Although generally more expensive, projects in this category can be extremely effective for improving traffic flows at major urban freeway interchanges. Freeway-to-freeway interchanges with design deficiencies can create significant choke points because they require traffic to merge or weave in very dense vehicular conditions. Improvements at these interchanges will reduce recurrent

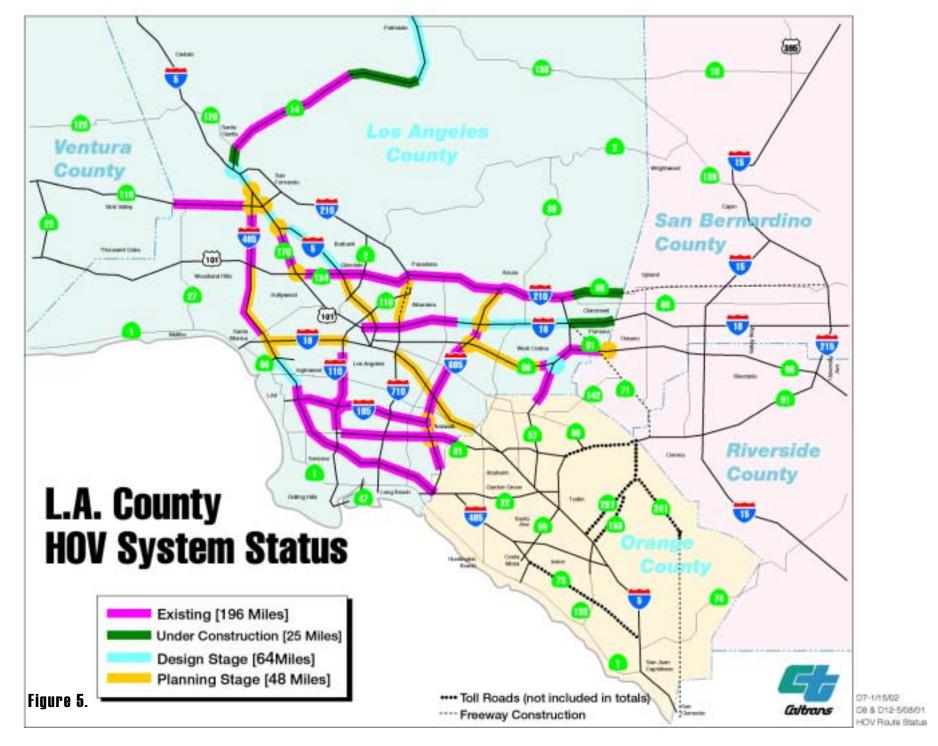




Figure 6.

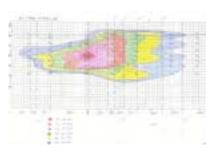
delays and enhance safety as well. The TOPS Unit will identify and develop investment projects in this highway-related TOPS element.

TRAVEL TIME STUDIES

The purpose of a travel time study is to evaluate and identify congested segments of the freeway system within the District with respect to the time of day. The reports, prepared as part of the travel time studies, document and analyze the data collected during the studies. The reports are also the first step towards developing a comprehensive historical data set of actual distance-versus-speed run data. The 'distance-versus-speed' run data, combined with the freeway configuration and typical traffic volume, are used to analyze and eventually develop a rational procedure to alleviate the observed congestion conditions. The reports are also used as a basis to evaluate distance-versus-speed values from ATMS for reliability and accuracy.

Traffic travel time data, also known as "tach run" data, are collected by traveling in a designated lane on freeways over a specific segment of the system. During a tach run, travel time and speed data are collected using vehicles that are outfitted with specialized computer equipment.

The tach runs are conducted in both HOV and MF lanes during the morning and evening peak periods in the peak-direction of travel. The test vehicles are dispatched at 15-minute intervals. In addition to recording travel time and speed data, the computerized equipment also records the amount of delay at specific locations along the evaluation route.



Average Speed Contour Map developed for southbound Interstate Route 110 with "tach run" data

The "tach run" data are then tabulated with the duration and dates that the studies were conducted. Locations of congested areas are also identified in the tach run data table. The data are then analyzed to determine cost-effectiveness, air quality impacts, and freeway operational impacts. For the purpose of the studies, congestion is defined as traffic speeds below 35 miles per hour (mph), lasting longer than 15 minutes. The defined speed of 35 mph is also used to calculate delay costs due to congestion.

DEMONSTRATION PROJECTS

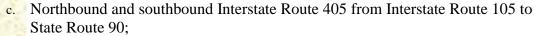
The TOPS Unit is currently working on two demonstration projects to evaluate future alternatives for long-term investments and a new transportation management tool in development. Results of the demonstration projects will be analyzed and utilized in the implementation of TOPS to alleviate the congestion within the District.

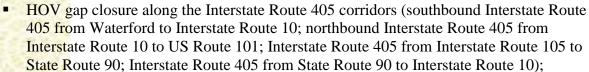
A. Interstate Route 405 Corridors

One of the two demonstration projects currently underway utilizes a microsimulation software to evaluate long-term investments planned for Interstate Route 405 between United States (US) Route 101 and Interstate Route 105. This demonstration project will incorporate

improvements that involve all levels of highway-related TOPS and will present such congestion relief elements as follows:

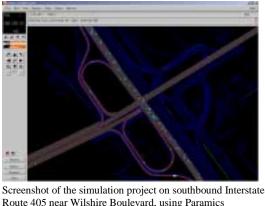
- Modified ramp metering and connector metering;
- Reconfiguration and/or reconstruction of freeway ramps to improve storage and operations;
- Construction of auxiliary lanes on:
 - a. Southbound Interstate Route 405 from Waterford Street to Interstate Route 10
 - b. Northbound Interstate Route 405 from Sunset Boulevard to Mulholland Drive





- Construction of HOV drop ramps in University of California at Los Angeles (UCLA)/Westwood area; and
- Reconfiguration and/or reconstruction of US Route 101/Interstate Route 405 and Interstate Route 10/Interstate Route 405 interchanges.

The TOPS Unit will utilize the microsimulation software called Paramics for this demonstration project. Paramics is short for Parallel Microscopic Simulation and is a graphical analysis tool designed for testing the operation of complex street and freeway systems. Paramics was jointly developed by the Edinburgh Parallel Computing Center and SIAS, LTD. Consultants. Since Paramics was first developed, the two developers have parted ways and developed their own version of Paramics that do not share the same features or capabilities. The Department, including the TOPS Unit, currently uses Paramics developed and marketed by Quadstone Ltd. in Edinburgh, Scotland.



Route 405 near Wilshire Boulevard, using Paramics



Screenshot of Paramics in 3-D simulation mode



There are a few other traffic simulation softwares in the market, including SYNCHRO and CORSIM. However, the Quadstone version of Paramics has several features that distinguish it from other simulation softwares: user adjustable driver behavior, customizable vehicle types, and dynamic traffic assignment. Many features in Paramics are very dependent on traffic, volume, and behavior data entered by users, giving users a high level of control over the simulation generated. As a rule of thumb, Paramics is selected when large and/or complex traffic systems requiring

route choices need to be simulated (i.e. implementation of HOV lanes and congestion study). SYNCHRO and CORSIM are usually used for less complex system requiring simulation of ten or fewer intersections.

B. Interstate Route 210 Corridor

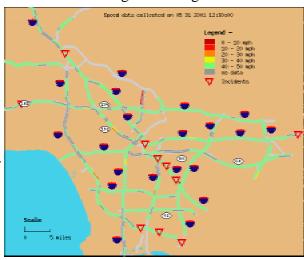
The other of the two demonstration projects currently underway will evaluate a new traffic management tool in development that is currently integrated into the District ATMS. This demonstration project implements the System Wide Adaptive Ramp Metering (SWARM) strategy that will be used to dynamically manage traffic and alleviate the congestion experienced within the District. The SWARM strategy uses basic ramp metering concepts and instantly analyzes the complete system based on the real-time traffic condition data received from the intelligent infrastructure. A private company, National Engineering Technology (NET), has programmed the new traffic management tool to develop its own ramp metering rates for on-ramps and forecasts traffic conditions at bottlenecks upstream on a real-time and dynamic basis.

The new traffic management tool was recently tested on a section of westbound Interstate Route 210 from Vernon Avenue to Lake Avenue (Post Miles from R38.87 to R26.14). The testing was conducted with three different modes of SWARM strategy (Mode 1, 2b, and a combination of 1 and 2b) during an evaluation period from January to May of 2001.

Although several problems were encountered during the testing and evaluation, the Department and NET have worked to resolve all the issues that have been identified. Following the completion of the testing and evaluation, a Preliminary SWARM Study Report has been prepared in November 2001, and contains the data collected during the testing.

FREEWAY PERFORMANCE MEASUREMENT

This is an experimental project being conducted by the Electrical Engineering and Computer Science Department at the University of California at Berkeley in cooperation with the Department through the Partners for Advanced Transit and Highways (PATH) program. The object of this project is to collect historical and real-time freeway traffic data from the State freeways and to compute freeway performance measures that can be valuable to a range of users, including the Department, policymakers, academia, transportation community, and the general public.



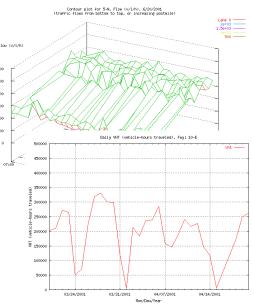
Screenshot of PeMS displaying colorcoded real-time traffic speeds with incident

The traffic data are collected using approximately 14,000 loop detectors currently in service in the MF lanes, HOV lanes, and at metered freeway ramps throughout Los Angeles and Ventura Counties. A loop detector detects vehicles when they are directly above it and generates a detector datum. The collected detector data are then transported via a communication system to the TMC in each District and processed every thirty seconds to calculate traffic volumes and lane occupancies. Freeway Performance Measurement System (PeMS) filters, processes, aggregates, and analyzes the loop detector data collected from the State freeways. PeMS is a low-cost system that utilizes commercial off-the-shelf products, the Department's Wide Area Network (WAN), and the Internet to

make information readily available. A major innovation developed in this project is that this system is capable of analyzing the trends of freeway measures over a significant period of time (2-3 years), utilizing the historical data that are collected and archived in the ATMS.

PeMS benefits engineers and planners in the Department as well as policymakers, academia, transportation community, and the general public with the following capabilities:

- Evaluation of performance measures;
- Congestion monitoring on urban area freeways, including plotting delay hours;
- Traffic engineering analyses, including speed versus flow diagrams or occupancy;
- Displaying real-time speed maps and plotting daily or average congestion (as shown to the right);
- Displaying contour plots for a selected route;
- Generating planning information such as vehiclehours traveled, delay, volumes, and speeds;
- Evaluation of long-term trends in traffic data
- Calculation of excess demand;
- Travel time estimating and routing for MF and HOV lanes.
- Real-time event/incident information;
- Downloading historical traffic data; and
- Investigation of loop detector health.



Screenshots of PeMS displaying analytical data plots

Although PeMS is currently collecting, storing, and synthesizing data on the Internet, it is operating at an experimental stage and, therefore, many of the aforementioned features are currently in development and will be available in the near future. PeMS is currently receiving and storing real-time traffic data from the District. The Department anticipates that PeMS will be fully connected with other districts in the near future.

REGIONAL COORDINATION

TOPS represent a system operation-centered approach that requires institutional coordination at the planning, operations, and funding levels. Full implementation of these strategies will require significant regional coordination. Currently, regional planning is accomplished through the local regional transportation planning process and the development of the Regional Transportation Improvement Program (RTIP).



Local partners of the Department in improving the quality of transportation

Every three years, the Southern California Association of Governments (SCAG) revises the Regional Transportation Plan (RTP), or Community Link 21, with updated information and a new environmental clearance. The RTP is Southern California's 20-year transportation vision that links and connects the communities that make up the Southern California region to other areas, the nation and world. The RTP is a comprehensive planning document that provides long-term solutions to the region's transportation needs under a framework that meets mobility, air quality regulations, and other regional goals.

The RTP is a critical document for projects to qualify for future federal, state, and local funding sources. The plan includes the six-county Southern California region (Ventura, Los Angeles, Orange, San Bernardino, Riverside and Imperial counties) requiring the coordination of regional and local agencies, tribal governments, as well as public and private individuals and organizations working together to plan future transportation needs as, for example, illustrated on Figure 7 for daily truck volumes projected to the year 2020. Figures 8 and 9 depict a future rail system and a planned high speed rail system within the SCAG region, respectively, for the year 2020. Figures 7 through 9 were prepared by the SCAG as part of the RTP in 1998, to demonstrate the future needs and planning.

The TOPS Unit coordinates the efforts with adjacent districts in developing projects that span over two or more districts. This approach is focused on regional system management rather than limiting efforts to jurisdictions. Attachment C contains a list of projects currently developed by combined efforts among different districts in Southern California. Locations of the projects are displayed on Figure C-1 following the list.

As indicated above, the TOPS Unit has and will continue to coordinate with local and regional agencies in developing projects to demonstrate the commitment to overall system management and develop effective partnerships to combat congestion. The TOPS Unit will also continue to work with other TOPS Units in adjacent districts to develop appropriate congestion relief measures region-wide.

CONCLUSIONS

As indicated thus far, the TOPS Unit has initiated several TOPS projects that now await funding. Additionally, the TOPS Unit has identified over seventy candidate projects that will help alleviate congestion in the District. Although the TOPS Unit has primarily focused its activities on the first-level TOPS projects so far, as more funds become available, the range of its activities will be broadened to include the second and third level projects. The TOPS Unit will continue in its current efforts to support the existing planning and programming process for initiating the second-level and third-level projects as identified in the Ten-Year SHOPP Plan Project List included in Attachment D. The TOPS Unit is also conducting demonstration projects to evaluate long-term investments and new management tools. During the development of potential investments, the TOPS Unit has coordinated with the local and regional agencies and continues to seek any available funding resources to fund TOPS projects.

The research, analysis, and evaluation of TOPS projects clearly indicate that it is a strategy that must be implemented aggressively, based on the conservative estimate that they yield greater benefit-cost ratio than any other STIP projects. In a continued cooperation with the local and regional agencies, the TOPS Unit will make every endeavor to maximize the efficiency of existing freeway systems and relieve congestion by developing and delivering more TOPS projects, so that the public will realize the benefits of TOPS.



Figure 7.



Figure 8.



Figure 9.

ATTACHMENT A

Office of Freeway Operations Non-Capacity Increasing Operational Improvement (Code 310 & 315) SHOPP Project List Updated 09/24/01

PRI- ORITY	EA	PM	со	RTE	BkPM	AhPM	TYPE OF WORK	COST (\$M)	PID Target Date	PID Approval Date	Proposed SHOPP Program Yr
1	21500	Andraos E.	LA	10	5.78	6.38	N/B 405 TO E/B 10 CONNECTOR TO OVERLAND AVE (Scoping)	32.5	10/2/01		2002-MID
2	Pending	Gorgy E.	LA	10	21.6		W/B 10 to 710 (Scoping)	TBD	10/2/01		2002-MID
3	12994	Chmielewski D.	LA	2	15.1		INSTALL COMM/TOS #4 FIELD HARDWARE	6.246	4/20/00	4/20/00	2002
4	16811	Chmielewski D.	LA	110	9.9		INSTALL CCTV & OTHER COMM SYS	5.456	4/21/00	4/21/00	2002
5	12097	Chmielewski D.	LA	57	0		INSTALL COMM SYS CCTV, TOS-3	9.253	3/28/00	3/28/00	2002
6	20340	Vassiliades J.	LA	405	20.22		INSTALL CONNECTOR METERING AT ROUTE 105 AND ROUTE 90	1.5	6/23/00	6/23/00	2002
7	18880	Novotny S.	LA	405	9.4		WIDEN S/B WILMINGTON AVE OFF-RAMP	0.9	11/17/99	11/17/99	2002
8	4F910	Quinonez M.	LA	5	14	15.2	CONSTRUCT DECELERATION LANE, WIDEN CALZONA S/B OFF-RAMP	6.84	1/18/00	1/18/00	2002
9	20380	Fateh R.	LA	118	4.8		WIDEN W/B TAMPA AVE OFF-RAMP	3.1	11/1/00	10/20/00	2002
10	21460	Saghafi A.	LA	5/10/57/60 /210/605	Var		ELECTRICAL LOOP DETECTOR REPLACEMENT	2.1	12/31/00	1/4/01	2002
11	21470	Wang E.	LA /VEN	5/10/101/ 118/170/405	Var		ELECTRICAL LOOP DETECTOR REPLACEMENT	1.4	12/31/00	1/4/01	2002
12	21480	Tran M.	LA	91/105/110/ 405/710	Var		ELECTRICAL LOOP DETECTOR REPLACEMENT	1.4	12/31/00	1/4/01	2002
13	21510	Tran M.	LA	Var	Var		LOOP DETECTOR REPLACEMENT	4.3	12/1/00		2002
14	21410	Palaha J.	LA	10	47.4		W/B 10 TO W/B 57 CONNECTOR	6.8	6/30/01		2002
15	21740	Gorgy E.	LA	5	16.2	16.4	AUXILIARY LANE ON S/B 5 FROM MARIETTA UC TO LORENA ST OC	2.1	6/30/01		2002
16	20490	Andraos E.	LA	405	39.09		WIDEN S/B 405 ON-RAMP AT VENTURA BLVD	1.5	6/30/01		2002
17	20420	Ekrami S.	LA	10	4.703		WIDEN E/B 10 ON-RAMP AT BUNDY DR	1	6/30/01		2002
18	20520	Andraos E.	LA	405	36.98		WIDEN S/B 405 ON-RAMP AT SKIRBALL CENTER DR	1.6	6/30/01		2002
19	12993	Chmielewski D.	LA	210	36		INSTALL COMM/TOS #4 FIELD HARDWARE	5.25	10/4/00	10/4/00	2002
20	12088	Chmielewski D.	LA	101	25.3	38.2	INSTALL CCTV & OTHER COMM SYS	5.6	7/17/00	7/17/00	2002
21	12997	Chmielewski D.	LA	210	18.8	24.9	INSTALL COMM/TOS #4 FIELD HARDWARE	4.78	10/23/00	10/23/00	2002
22	18210	Chmielewski D.	LA	10	4.5		UPGRADE SURVEILLANCE SYSTEM	1.031	8/25/00	8/25/00	2002
23	12076	Chmielewski D.	LA	10	30.7	48.3	INSTALL CCTV & OTHER COMM SYS	7.74	12/22/00		2002
24	12077	Chmielewski D.	LA	5	45.6	88.6	INSTALL CCTV & OTHER COMM SYS	4.202	11/29/00		2002
25	Pending	Vassiliades J.	LA	91	17.08	18.18	AUXILIARY LANE ON W/B 91 APPROACHING NB 605 (Scoping)	2.3	12/30/01		2002-MID
26	22400	Gorgy E.	LA	5	14.8	15.2	S/B 5 FROM DITMAN TO CALZONA-AUX LANE	4	12/30/01		2002-MID
27	16640	Quinonez M.	LA	5	11.8		WIDEN TELEGRAPH/WASHINGTON RAMPS	3	TBD		2002-MID
28	Pending	Vassiliades J.	LA	5	16	16.1	LENGTHEN MERGE LENGTH FROM E/B 60 TO S/B 5 (Scoping)	1.5	12/30/01		2002-MID
29	23160	Vassiliades J.	LA	405	18.2		WIDEN N/B INGLEWOOD LOOP ON-RAMP	2	12/30/01		2002-MID
30	4N710	Ekrami S.	LA	10	4.703		METER 2-SOV LANES AT E/B BUNDY DRIVE ON-RAMP	0.08	12/30/01		
31	4H680	Andraos E.	LA	405	32.8	33	WIDEN N/B SUNSET BLVD ON/OFF RAMPS	0.5	12/30/01		2002-MID

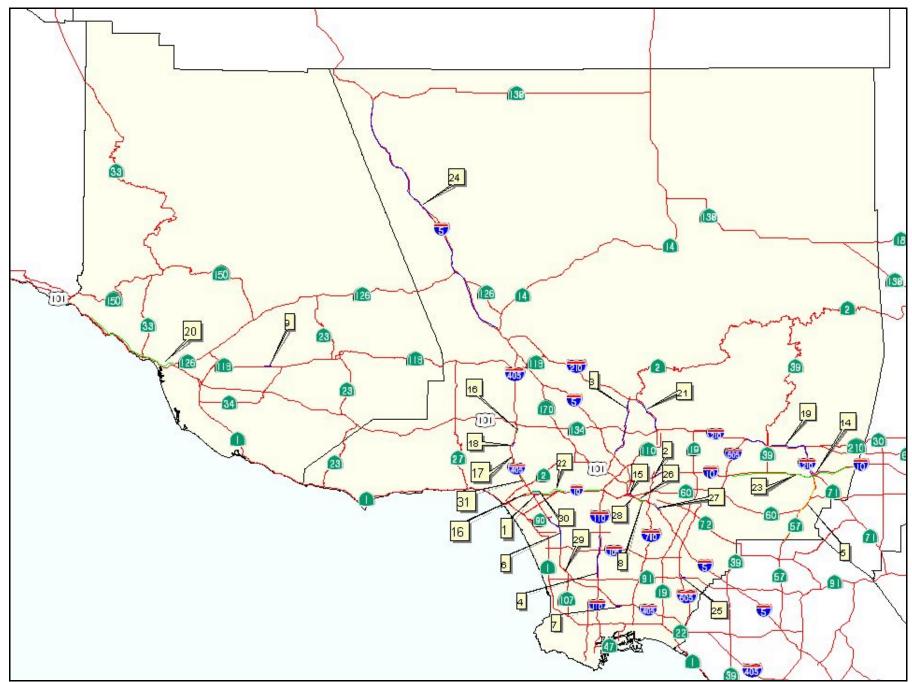


Figure A-1

ATTACHMENT B

#	PSR Agency	Freeway	Direction	Post Mile	Category	Project Location	Problem	Potential Improvements	PROJECT DESCRIPTION
1	Caltrans	5	SB	0.71		Phoebe	Congestion resulting from merging from I5 connectors to E/B Route 118		
2	Caltrans	5	NB	5.25	Auxiliary lane	Pioneer	Severe Congestion resulting from merging and weaving	Add N/B auxiliary lane Pioneer to Florence Avenue	Auxiluary lane
3	Caltrans	5	NB	8.65	Auxiliary lane	605 JCT	Severe Congestion resulting from merging and weaving	Add N/B auxiliary lane from Florence to Rte. 605 Connector Off	Auxiluary lane
4	Caltrans	5	NB	9.5	Auxiliary lane	Paramount	Severe Congestion resulting from merging and weaving	Add N/B auxiliary lane from N/B 19 to Paramount Blvd	Auxiluary lane
5	Caltrans	5	SB	10.76	Auxiliary lane	Garfield	Congestion resulting from merging from I5 connectors to E/B Route 118	Add S/B auxiliary lane from Slauson to Bandini Blvd.	Auxiluary lane
6	Caltrans	5	SB	17.44		4th Street	Congestion resulting from merging from I5 connectors to E/B Route 118		
7	Caltrans	5	NB	16.13	Auxiliary lane	Euclid	Severe Congestion resulting from merging and weaving	Add auxiliary lane from Marrietta UC to Lerena OC, close Concord St on-ramp	Auxiluary lane
8	Caltrans	5	NB	20.44	Auxiliary lane	110 JCT	Congestion resulting from merging from I-5 connector and Ave 26 on-ramp to N/B 110	Lengthen auxilliary lane between Alameda and Olive St.	Auxiliary lane
9	Caltrans	5	NB	28.45	Connector	Alameda	Congestion resulting from merging from I5 connectors to E/B Route 118	Widen the connector	Conector widening
10	Caltrans	5	NB	36.36	Add Lane	118 JCT	Congestion resulting from merging from I5 connectors to E/B Route 118	Collector/distributor roadway	New lane
11	Caltrans	10	WB	0.18	Add Lane	101 JCT	Congestion and delay up to 45 min. at peak	Add new lane west to Fwy 405	New Lane
12	Caltrans	10	WB	7.81	Add Lane	Robertson	Heavy on-ramp volumes	Add an additional lane from Harcourt to Overland Ave.	New Lane
12	Caltrans	10	WB	8.75	Add Lane	La Cienega	Heavy on-ramp volumes	Add an additional lane from Harcourt to Overland Ave.	New lane
13	Caltrans	10	WB	10.7		Harcourt	Lane drops (5th lane)becomes a CD to La Brea Ave.	п	
14	Caltrans	10	WB	23.29	Add Lane	Atlantic	Atlantic to Rte 710	Add #5 lane	New lane
15	Caltrans	10	WB	33.48	Add Lane	Puente	Puente Ave to Rte 605	Add #5 lane	New lane
16	Caltrans	10	EB	5.45	Add Lane	405 JCT	Heavy on-ramp traffic too close to I/C w/short weaving distance	Add lane through interchange, Construct Bundy Drive on-ramp fly over to EB 10	New lane
17	Caltrans	10	EB	9	Add Lane	Hauser	Lane drop (#5) to La Brea Ave CD	Add #5 lane through La Brea Ave Interchange	New lane
18	Caltrans	10	EB	14.12	Add Lane	Hoover	Heavy weaving/merging before I/C (Rte 110/10)	Realign and widen E/B 10 to S/B 110 connector to reduce weaving	Realign and widen Ramp
19	Caltrans	10	EB	14.84	Ramp	110 JCT	·	Realign and widen W/B 10 to 110 transition to reduce conflicts	Realign and widen Ramp
20	Caltrans	10	EB	17.35	Ramp	Olympic	Heavy on-ramp traffic proximity to East L.A. Interchange	Redesign East Los Angeles Interchange, meter on-ramp	Connector modification

#	PSR Agency	Freeway	Direction	Post Mile	Category	Project Location	Problem	Potential Improvements	PROJECT DESCRIPTION
21	Caltrans	10	EB	21.38	Connector	710 JCT		Realign and widen W/B connector to S/B 710	Connector modification
22	Caltrans	10	EB	32.31		Baldwin			
23	Caltrans	10	EB	47.24		Mountain			
24	Caltrans	57	SB	4.52	Connector	60 JCT	Weaving Problem	Realign and widen N/B 57 connector to E/B 60	Connector modification
25	Caltrans				Connector		Weaving Problem	Realign and widen S/B 57connector to W/B 60	Connector modification
26	Caltrans	60	WB	0.45	Add Lane	Soto	5 lanes to 3 lanes	Add lane pass the interchange from NB5 to WB60	New lane
27	Caltrans	60	WB	7.6	Auxiluary lane	Paramount	Fwy slight uphill grade, reduce speed with truck presence	Add auxiliary lane from San Gabriel to Paramount	Auxiluary lane
28	Caltrans	60	WB	15.78	Add Lane	Hacienda	Heavy off-ramp at Hacienda	Add additional lane @ Hacienda off-ramp	New lane
29	Caltrans	60	EB	4.53	Add Lane	Atlantic	Fwy drops from 5 to 4 lanes	Add additional lane	New lane
30	Caltrans	60	EB	8.52		Garfield			
31	Caltrans	60	EB	16.12	Auxiluary lane	Hacienda	Lane drops at Azusa	Add auxiliary lane from Azusa to Hacienda	Auxiliary lane
								Truck lane from Crossroad to 7th Ave.	Truck lane
32	Caltrans	91	WB	10.48	Add Lane	Santa Fe	Two lane drop and heavy weaving	Extend one lane to Avalon Blvd on-ramp	Extend lane
33	Caltrans	91	WB	16.94	Add Lane	605 JCT	Capacity Breaks down at the interchange	Add a through lane on mainline	New lane
34	Caltrans	91	EB	14.59	Bridge	Lakewood	A lane drop at Lakewood off reduces capacity	Widen Lakewood Blvd bridge to carry this lane over the bridge.	Bridge modification
35	Caltrans	101	SB	1.57	Add Lane	110 JCT	Congestion and delay up to 60 minutes, AM and PM periods	Add a new lane Normandie to 110 freeway	New lane
36	Caltrans	101	SB	9.31	Add Lane	Barham	Congestion and delay up to 40 minutes, AM and PM periods	Add new lane on SB Woodman to Vineland	New lane
37	Caltrans	101	SB	11.75		134/170 JCT			
38	Caltrans	101	SB	17.17		405 JCT		Widen 101 N/B connector to S/B 405	Modify connector
39	Caltrans	101	NB	0.7	Connector	110 JCT			

#	PSR Agency	Freeway	Direction	Post Mile	Category	Project Location	Problem	Potential Improvements	PROJECT DESCRIPTION
40	Caltrans	101	NB	8.11		Cahuenga			
41	Caltrans	101	NB	17.59		Haskel			
42	Caltrans	105	WB	2.11		405 JCT			
43	Caltrans	105	WB	10.1		Willmingto n		Add E/B auxiliary lane from Wilmington off to Wilmington on	Auxiliary lane
44	Caltrans	105	WB	15.6	Auxiliary lane	Lakewood		Add auxiliary lane from Paramount to Lakewood	Auxiliary lane
45	Caltrans	105	EB	4.2	Auxiliary lane	Yukon		Add W/B auxiliary lane Crenshaw off to Crenshaw on	Auxiliary lane
46	Caltrans	105	EB	9.7	Auxiliary lane	Willmingto n			
47	Caltrans	105	EB	17.82		605 JCT			
48	Caltrans	110	SB	17.88	Add Lane	Slauson	Heavy demand from surrounding ramps breaks capacity	Add Capacity by adding lane from Rte 10 to Slauson Ave.	New lane
49	Caltrans	110	SB	23.73	Connector	101 JCT		Construct N/B 110 to S/B 5 direct connector	New Connector ramp
50	Caltrans	110	NB	23.05		3rd street			
51	Caltrans	110	NB	23.69		101 JCT			
52	Caltrans	134	WB	0		170 JCT			
53	Caltrans	134	WB	2.86		Buena Vista			
54	Caltrans	134	WB	5.47		5 JCT			
55	Caltrans	170	SB	14.5	Connector	134 JCT		Construct S/B 170 to N/B 101 2-lane direct connector	New Connector ramp
56	Caltrans	170	NB	20.53	Connector	5 JCT		Redesign Connector and Add 1 lane	Modify Connector
57	Caltrans	210	WB	24.96	Auxiliary lane	134/170 JCT	Traffic congested from 605 connector to Rosemead	More auxiliary lanes needed.	Auxiliary lane
58	Caltrans	210	WB	31.72	Auxiliary lane	Santa Fe	Traffic congested from 605 connector to Rosemead	More auxiliary lanes needed.	Auxiliary lane
59	Caltrans	210	WB	36.41	Auxiliary lane	605 JCT	Traffic congested from 605 connector to Rosemead	More auxiliary lanes needed.	Auxiliary lane

# PSR Agency	Freeway	Direction	Post Mile	Category	Project Location	Problem	Potential Improvements	PROJECT DESCRIPTION
60 Caltran	210	EB	29.46	Auxiliary lane	Siera Madre			
61 Caltran	210	EB	36.41		605 JCT	Traffic to LA 210 E/B much heavier than to 605 S/B		
62 Caltran	405	SB	0		605 JCT	Standard 4 lanes throughout area, probable cause is Rte 605 from Rte 405 traffic	District 12 area	
63 Caltran	405	SB	16.57	Auxiliary lane	91 JCT	congestion due to excess capacity	Add Auxiliary lane to Crenshaw	Auxiliary lane
64 Caltran	405	SB	19.57	Traffic Signal	137 street	Auxiliary lane ends at Rosecrans and off ramp backup onto Fwy @ peak periods also weaving area from 105 connector.	Signalize intersection @ bottom St. off-ramp	Traffic signals
65 Caltran	405	SB	29.54	Connector	10 JCT	Fwy drops from 5 to 3 lanes at intersection with Rte 10	Widen N/B 405 connector to E/B 10, Add lane both directions from 3 to 4 lanes	Modify Connector
66 Caltran	405	SB	29.93	Ramp meter	90 JCT	Curve capacity constraint at Howard Hughes and LaTijera, lane drop from 5 to 4 lanes.	Connector meter EB 90 to SB 405, add lane from LaTijera to La Cienega	New meter and New lane
67 Caltran	405	SB	34.73		Getty center			
68 Caltran	405	SB	39.43	HOV lane	101 JCT	weaving to and from Rte 101 and ending of HOV lane	HOV lane and connect meters from Rte 101	HOV lane
69 Caltran	405	NB	1.73	Add Lane	Woodruff	Auxiliary lane ends at Woodruff mostly Rte 605 connector traffic	Extend the 5th lane	New lane
70 Caltran	405	NB	19.16	Add Lane	Rosecrans	Congestion	Add lane from Hawthorn to Rte 105	New lane
71 Caltran	405	NB	36.93	Ramp	Mulholland		Realign and widen S/B on-ramp at Skirball.	Realign and widen Ramp
72 Caltran	605	SB	9.61	Add Lane	5 JCT	4 lanes to 3 lanes	Add #4 through lane	New lane
73 Caltran	605	NB	2.93		Del Amo			
74 Caltran	605	NB	9.61	Ramp	5 JCT	Before 605/5 interchange, NB narrows from 4 to 3 lanes then back to 4 lanes after the interchange	Maintain 4 continuous lanes in area and widen Florence Ave structure, modify Florence on-ramp	Modify ramp
75 Caltran	605	NB	19.5	Auxiliary lane	Valley		Auxiliary lane Valley to Rte 10	Auxiliary lane
76	710	SB	21.95	Auxiliary lane	Atlantic		Add S/B auxiliary lane from Washington Blvd. to EB Atlantic	Auxiliary lane
77	710	SB	23.28	Connector	5 JCT	SB 710 to SB 5	Relocate connector from Left Side to Right Side Off	Modify Connector
78	710	NB	17.05	Ramp	Imperial		Widen E/B Imperial to N/B 710 on and W/B Imperial to S/B 710 on	Widen and add new ramp

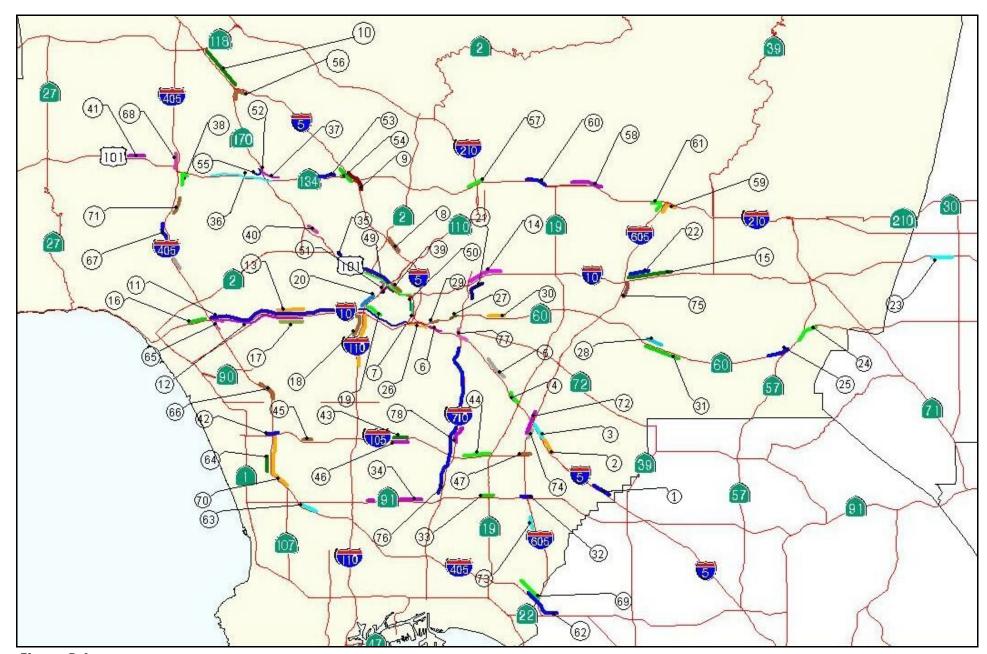


Figure B-1

ATTACHMENT C

Inter-District Coordination

Projects Bordering Orange County

	District	Rte	EA	BPM/APM	Description	Cost (\$M)	Status
1	7	405	116784	0.2/7.9	In Long Beach and Signal Hill-Reconstruct Freeway (HOV)	29.7	Contract Construction Acceptance 5/98
2	7	605	1347U1	0.0/4.3	Orange County(OC) Line to 183rd St-Add HOV lane & Rehab ramps	11.8	Begin Construction 7/22/99, CCA 8/02
3	7	5	101671	U U/h X	OC Line Rte 605 & Orange-Widen Fwy & reconstruct ICS, (R/W only), PSR/PR EA 168800	48.5	Right of Way Certification 2/02
4	7	5	14580K	0.1/13.8	In La Mirada from LA/OC Line to Rte 710, MIS/PSR only	800.0	Major Investment Study
5	7	5	168800	0.1/8.3	In La Mirada to SFSP from Rte 91/Rte 19-Widen Fwy for interim HOV lanes	188.0	Environmental Documents 12/99
6	7	5	168811	0.1/3.4	In La Mirada/NRW from LA Co Line to Rosecrans Ave UC, Interim HOV lanes (Segment B)	100.0	Ready to List 5/02
7	7	5	1186A4	0.0/6.9	In La Mirada, Santa Fe Spring, Norwalk-CCTV system	3.5	CCA 3/97
8	7	57	115031	0.0/R4.5	In LA/OC in and near Brea and Diamond Bar-Construct HOV lane	18.2	CCA 12/97
9	7	405	120823	0.0/16.7	In L.A. Co in various locations-Install Comm system	8.2	CCA 6/00
10	7	605	134701	0.0/3.8	OC Line to South St.	14.6	PS&E
11	12	57	01210	19.9/20.9	Widen ramps in Brea at Imperial Hwy and Lambert	0.8	
12	12	57	09780	18.3/20.1	Add auxiliary lane in Fullerton & Brea Yorba Linda Blvd	20.0	
13	12	405	0853U	8.7/24.2	Fiber optics television system in OC at various locations	4.4	

Projects Bordering San Bernardino County

	District	Rte	EA	BPM/APM	Description	Cost (\$M)	Status
14	7	30	129991	R0.0/2.7	TOS project from Rte 210 to Rte 66, on Rte 60 from Rte 52 to San Bernardino Co (SBD) Line and from Rte 10 to SBD Line-Install COMM/TOS #4 Field Hardware	6 4	RTL 10/02
15	7	30	119984	R0.0/T2.7	In and near Glendora and San Dimas-construct HOV lane	7.0	CCA 3/98
16	7	30	1262U1	RHY/R/Y	In and near San Dimas & La Verne from 0.1E Amelia Ave/Damien Ave, LA-66-0.0/0.4-Construct I/C, SW, Widen E/B ramp	2.7	RTL 10/97
17	7	10	122401	42.4/48.3	Rte 57 to SBD Line-Construct HOV lanes	74.0	PS&E
18	7	30	105010	2.3/8.3	(Rte 210) Foothill Blvd to SBD Line-Construct HOV lanes	264.0	In construction
19	8	60	450000	0.0/10.0	LA/SBD Co Line to SBD/RIV Co line-Install CMS, CCTV	4.8	RTL 11/00
20	8	71	N/A	0.0/8.3	LA/SBD Co Line to SBD/RIV Co Line-Install FO, CCTV, CMS, VDS, connect RMS	5.0	PSR/PR due in HQ 9/1/03
21	8	210	206230	0.0/1.5	Seg 1-LA/SBD Co Line to Mountain Ave-Install FO, CCTV, CMS, RMS, VDS	26.7	Due in OE 8/31/00

Projects Bordering Kern County

	District	Rte	EA	BPM/APM	Description	Cost (\$M)	Status
22	2 7	5	120770	R45.6/R88.6	In LA from Rte 14 to Kern Co Line-Install CCTV and other COMM sys	4.3	ED 9/99, RTL 1/03
23	6	5	New	0.0/87.0	In Kern County at various locations-Install HAR, CMS	4.0	03/04 FY (CMS), 06/07 FY (HAR)
2	6	5	333561	Var	In Kern County at various locations-Install Traffic Surveillance Stations	1.7	PR comp. 2/7/99, PS&E est. 4/00



Figure C-1

ATTACHMENT D

FY	DIST	COUNTY	ROUTE	ВК РМ	AHD PM	PROJECT DESCRIPTION	EA	CAPITAL COST (\$1,000)
2003	7	LA	10	5.79	6.38	Add E/B auxiliary lane from I-405 connectors to National Blvd	21500K	\$5,000
2003	7	LA	91	8	8.2	Replace Structure & Upgrade railing at Central Avenue	166600	\$1,500
2003	7	LA	101	4.1	4.5	Widen OC Vermont Ave	20190K	\$5,300
2003	7	LA	101	16.06	16.72	Add N/B auxiliary lane from Van Nuys to Sepulveda		\$3,000
2003	7	LA	110	4.1	20.7	Construct Overhead signs from Rte 1 Sep to Adam Blvd, rehab	187801	\$1,000
2003	7	VEN	118	2.2	17.5	Add Passing Lanes at various locations	17300K	\$3,000
2003	7	LA	405	29.13	29.13	Widen N/B 405 connector to E/B 10	21500K	\$4,000
2003	7	LA	30/60/71	0	2.7	On Rte 30 from Rte 210 to Rte 66, on Rte 60 from Rte 57 to San Bernardino County Line and on Rte 71 from Rte 10 to San Bernardino County Line-Install Communication/TOS #4 field hardware	129991	\$6,300
2003	7	LA	10	30.7	48.3	0.1 mile west of San Gabriel River to San Bernardino County Line	120761	\$6,900
2003	7	LA	5	45.6	88.6	Route 14 to Kern County Line-Install cctv and other communication systems-Install cctv and other communication systems	120771	\$4,300
2003	7	LA	210	0	19	Route 5 to Route 2-Install Communication/TOS #4 field hardware	129981	\$9,100
2004	7	LA	5	15.16	16.03	Add S/B auxiliary lane from EB 60 Connector On to Calzona Off		\$4,000
2004	7	LA	5	16.03	16.03	Lengthen S/B merge lane at E/B 60 to S/B 5		\$2,000
2004	7	LA	101	16.92	16.92	Widen 101 N/B connector to S/B 405		\$12,000
2004	7	LA	57	R4.16	R4.16	Realign and widen N/B 57 connector to E/B 60		\$7,000
2004	7	LA	57	R4.45	R4.45	Realign and widen S/B 57connector to W/B 60		\$9,000
2004	7	LA	405	22.69	23.36	Add S/B auxiliary lane from Manchester Blvd to Century Blvd		\$2,000
2004	7	LA	405	23.78	24.46	Add N/B auxiliary lane from Florence to Hughes Parkway		\$1,800
2004	7	LA	405	22.7	25.7	Add auxiliary lanes from Rte 90 to Rte 105		\$5,000
2004	7	LA	405	25.5	28.8	Add S/B auxiliary lane from Sepulveda Blvd to Jefferson Blvd		\$2,000
2004	7	LA	405	28.9		Add additional lane @ National on-ramp		\$2,500
2004	7	LA	405	29.9	30.1	Add S/B auxiliary lane from Olympic Blvd to W/B 10 connector		\$3,000
2004	7	LA	405	30.1	30.7	Add S/B auxiliary lane from Santa Monica Blvd to Olympic Blvd		\$3,000
2004	7	LA	405	30.74	31.1	Realign and widen N/B and S/B on-ramps from Route 2		\$4,000
2004	7	LA	405	30.8	31.4	Add S/B auxiliary lane from Wilshire Blvd to Santa Monica Blvd		\$3,000
2004	7	LA	405	31.01		Add N/B auxiliary lane from Santa Monica Blvd to Wilshire Blvd		\$3,000
2004	7	LA	405	31.4	31.4	Realign and widen S/B on-ramp at Wilshire Blvd		\$2,500
2004	7	LA	405	31.63		Add N/B auxiliary lane from Wilshire Blvd to Montana		\$3,000
2004	7	LA	405	31.73		Add S/B auxiliary lane from Sunset Blvd to Wilshire Blvd		\$3,000
2004	7	LA	405	31.74		Realign and widen N/B on-ramp from Wilshire W/B		\$2,000
2004	7	LA	405	33.1	34.65	Add S/B auxiliary lane from Sepulveda Blvd to Sunset Blvd		\$3,000

FY	DIST	COUNTY	ROUTE	вк РМ	AHD PM	PROJECT DESCRIPTION	EA	CAPITAL COST (\$1,000)
2004	7	LA	405	36.5	36.5	Realign and widen S/B on-ramp at Skirball.		\$2,000
2004	7	LA	405	37.03	38.63	Add N/B auxiliary lane from Mulholland to Ventura Blvd		\$3,000
2004	7	LA	405	38.92	38.92	Widen N/B 405 connector to S/B 101		\$5,000
2004	7	LA	405	39.09	39.09	Realign and widen S/B on-ramp at Ventura Blvd.		\$2,000
2004	7	LA	10	R7.36	R7.36	Realign and widen W/B off-ramp to National		\$2,000
2004	7	LA	605	17.03		Install count loops where the connector crosses Studebaker		\$1,000
2004	7	LA	110	0.8	9.5	0.1 mile south of Route 47 to 0.2 mile south of 182nd Street-Install cctv and other communication systems	120841	\$4,800
2004	7	LA	47	0	4.6	Route 110 to Route 103 and on Route 103 from Route 47 to Willow Street-Install Communication/TOS #4 field hardware	129951	\$2,000
2004	7	Ven	101	13.5	27	0.3 mile south of Route 34 to 0.3 mile north of Main Street-Install traffic surveillance system	174601	\$14,000
2004	7	Ven	101	25.5	43.6	0.9 mile south of Route 126 to Santa Barbara County Line-Install traffic surveillance system	174701	\$4,600
2005	7	VEN	118	10.9	11	Modify Intersection at Rte 34/Donlon Rd		\$9,600
2005	7	LA	5	1.1	1.2	Grade separate Valley View ramps and Union Pacific RR		\$4,000
2005	7	LA	5	VAR	VAR	Electrical Loop Detector Upgrade	21460	\$2,100
2005	7	LA	5	2.3	2.4	Grade separate Carmenita ramps and Union Pacific RR		\$4,000
2005	7	LA/VEN	5	VAR	VAR	Electrical Loop Detector Upgrade	21470	\$1,400
2005		LA	5	2.34	3.28	Add S/B auxiliary lane from Rosecrans to Carmenita		\$1,500
2005		LA	91	VAR		Electrical Loop Detector Upgrade	21480	\$1,400
2005		LA	5	11.7	12.6	Add S/B auxiliary lane from Washington to Atlantic		\$2,000
2005		LA	5	14.4		Add N/B auxiliary lane from Downey Road to Indiana		\$2,000
2005	7	LA	405	20.22	26.89	Install connector metering at Rte 105 and Rte 90 connectors	20340	\$1,500
2005		LA	10	14.56	14.8	Realign and widen E/B 10 to N/B 110 connector		\$8,000
2005	7	LA	10	47.4	48.5	Widen connector	21410	\$1,800
2005	7	LA	10	11.28	12.94	Widen off-ramp @ Western, Arlington and Crenshaw		\$5,000
2005		LA	10	R4.50	R4.50	Realign and widen W/B off-ramp at Bundy North		\$2,000
2005	7	LA	10	R8.17	R8.17	Realign and widen W/B off-ramp at Robertson		\$2,000
2005	7	LA	405	39.09		Widen on-ramp	20490	\$1,500
2005		LA	10	S0.00	S0.00	Realign and widen W/B transition to N/B 101		\$3,000
2005		LA	10	4.703		Widen on-ramp	20420	\$1,000
2005		LA	60	8.5	9.3	Add auxiliary lane from San Gabriel to Rosemead		\$3,000
2005	7	LA	405	36.98		Widen on-ramp	20520	\$1,600

FY	DIST	TCOUNTY	ROUTE	ВК РМ	AHD PM	PROJECT DESCRIPTION	EA	CAPITAL COST (\$1,000)
2005	7	LA	60	22.8		Relocate on-ramp east of Brea Canyon		\$1,500
2005	7	VEN	118	10.9	11	Modify Intersection	10596	\$9,600
2005	7	LA	60	17.7	16.1	Add auxiliary lane from Azusa to Hacienda		\$2,000
2005	7	LA	60	10.1	9.7	Add auxiliary lane from Santa Anita to Rosemead		\$3,000
2005	7	LA	60	10.3	10.5	Add E/B auxiliary lane from Santa Anita to Cogswell		\$1,500
2005	7	LA	101	3.25	3.25	Realign and widen N/B off-ramp at Rampart		\$3,000
2005	7	LA	101	5.2	5.5	Add S/B auxiliary lane from Melrose to Santa Monica Blvd		\$4,000
2005	7	LA	101	5.96	5.96	Realign and widen N/B on-ramp at Western/Santa Monica		\$2,000
2005	7	LA	101	8.4	9.3	Add S/B auxiliary lane from Barham on-ramp to Highland off-ramp		\$3,000
2005	7	LA	105	4.22	4.72	Add auxiliary lane from Yukon to Crenshaw		\$2,000
2005	7	LA	105	9.63	12.44	Add auxiliary lane from Wilmington off to Harris		\$8,000
2005	7	LA	110	0.65		Extend acceleration lane and re-install on-ramp meter@ Sepulveda		\$2,000
2005	7	LA	605	R7.65		Re-install loops @ Rosecrans off-ramp from S/B and Rte 105 E/B		\$1,200
2005	7	LA	710	21.9	22.5	Add S/B auxiliary lane from Washington Blvd. to EB Atlantic		\$3,000
2005	7	LA	710	22.15	22.49	Add N/B auxiliary lane from EB Atlantic On to Washington Blvd. Off		\$3,000
2005	7	LA	710	22.48	22.58	Widen Washington Blvd off-ramps		\$2,000
2005	7	LA	14	24.7	33.3	Route 5 to Sand Canyon Road-Install Communication/TOS #4 field hardware	129961	\$5,800
2005	7	LA	14	33.1	58.3	Sand Canyon Road to Avenue S-Install Communication/TOS #4 field hardware	1299A1	\$6,500
2005	7	LA	14	58.1	74.2	Avenue S to Avenue D-Install Communication/TOS #4 field hardware	1299C1	\$4,000
2005	7	LA	710	15.7	27.5	Route 105 to Valley Blvd-Install communication system cctv	120941	\$6,800
2005	7	LA	210	36	48.6	Install Communication/TOS #4 field hardware	12993	\$9,000
2005	7	LA	110	9.9	17.5	Install cctv and other communication systems	168111	\$5,372
2005	7	LA	57/60/210	0	7.7	Install Communication system cctv	120971	\$9,642
2005	7	LA	101	25.3	38.2	Install communication system cctv	12088	\$10,400
2005	7	LA	1	var.	var.	Loop detector replacement	21510	\$4,300
2006	7	LA	5	3.28	3.44	Realign and widen off-ramps at Rosecrans		\$3,000
2006	7	LA	5	3.29	3.38	Widen Rosecrans Ave. Between NB and SB on- and off-ramps		\$1,000
2006	7	LA	710	22.57	23.31	Add N/B auxiliary lane from Washington Blvd. On to Olympic Off		\$3,000
2006	7	LA	5	3.44	3.6	Add S/B auxiliary lane from Firestone to Rosecrans		\$1,500
2006	7	LA	5	10.72	10.8	Lengthen acceleration and deceleration lanes at Garfield		\$2,000
2006	7	LA	5	11.7	11.7	Realign and widen off-ramp at Washington Blvd		\$1,500
2006	7	LA	5	13.78	15.96	Widen NB and SB 5 to provide standard shoulders		\$1,000
2006	7	LA	10	14.65	14.65	Realign and widen E/B 10 to S/B 110 connector to reduce weaving		\$10,000
2006	7	LA	10	14.98	14.98	Realign and widen W/B 10 to 110 transition to reduce conflicts		\$10,000

FY	DIST	COUNTY	ROUTE	BK PM	AHD PM	PROJECT DESCRIPTION	EA	CAPITAL COST (\$1,000)
2006	7	LA	10	21.6	22.41	Add auxiliary lane connection Fremont on-ramp to 710 connector		\$2,000
2006	7	LA	10	R4.70	R4.70	Realign and widen E/B on-ramp at Bundy		\$2,000
2006	7	LA	10	R7.68	R7.68	Realign and widen W/B on-ramp at Robertson		\$2,000
2006	7	LA	60	0	0.45	Viaduct from East LA interchange to Rte 10		\$4,500
2006	7	LA	60	16.1	17.8	Add auxiliary lane from Hacienda to Azusa		\$2,000
2006	7	LA	60	14.5		Add additional lane at 7th on-ramp		\$800
2006	7	LA	60	25.7		Add additional lane @ Diamond Bar Bl.		\$1,000
2006	7	LA	405	9.4		Widen S/B off-ramp	18880	\$900
2006	7	LA	60	19.3	18.1	Add auxiliary lane from Fullerton to Azusa		\$2,000
2006	7	LA	5	14	15.2	Construct deceleration lane at N/B Calzona off-ramp	4F910	\$6,840
2006	7	LA	60	15.8	14.4	Add auxiliary lane from Hacienda to 7th		\$2,500
2006	7	LA	118	4.8		Widen W/B off-ramp	20380	\$3,100
2006	7	LA	60	10.9	10.5	Add auxiliary lane from Peck to Santa Anita		\$3,500
2006	7	LA	5	16.2	16.4	Construct auxiliary lane	21740	\$2,100
2006	7	LA	60	11.7	11.7	Realign and widen E/B 60 connector to I-605		\$10,000
2006	7	LA	101	11.6	38.2	Upgrade signing	20760	\$3,800
2006	7	LA	60	19.66	19.66	Widen W/B off-ramp to Fullerton		\$3,000
2006	7	LA	10	2.2	21.4	Replace OH/Ground mounted guide sign panel	20500	\$3,000
2006	7	LA	91	R19.17	R19.17	Widen Bloomfield OC to provide longer N/B left-turn lane & sidewalk		\$2,000
2006	7	LA	110	25	25.5	Replace Tunnel lighting	4G300	\$1,500
2006	7	LA	101	3.13	3.13	Realign and widen N/B on-ramp at Rampart.		\$3,000
2006	7	LA	101	3.3	3.6	Add N/B auxiliary lane from Rampart to Silverlake		\$5,000
2006	7	LA	101	5.45	5.45	Realign and widen N/B off-ramp at Western/Santa Monica		\$3,000
2006	7	LA	101	7.9	7.9	Construct an elevated overpass for Highland Ave traffic to Barham		\$2,000
2006	7	LA	105	14.5	16	Add auxiliary lane from Downey to Clark		\$2,000
2006	7	LA	105	16.33	16.98	Add Auxiliary lane from Ardis to Dunrobin		\$3,000
2006	7	LA	605	R17.6	R19.2	Auxiliary lane Rte 60 to Valley		\$2,400
2006	7	LA	605	19.5	19.9	Auxiliary lane Valley to Rte 10		\$1,100
2006	7	LA	710	16.9	17.9	Widen E/B Imperial to N/B 710 on and W/B Imperial to S/B 710 on		\$4,000
2006	7	LA	710	19.5	19.9	Widen Florence Avenue bridge over LA River and widen off-ramp		\$8,000
2006	7	LA	710	6.88	9.03	Install loop detectors at various locations		\$2,000
2006	7	LA	710	6.8	15.7	0.1 mile south of Route 1 to Route 105-Install communication system cctv	120931	\$6,300
2006	7	LA	101	17.1	25.4	Install cctv and other communication systems	120751	\$5,700
2006	7	LA	210	18.8	24.9	Install Communication/TOS #4 field hardware	12997	\$5,400

FY	DIST	TCOUNTY	ROUTE	BK PM	AHD PM	PROJECT DESCRIPTION	EA	CAPITAL COST (\$1,000)
2006	7	LA	10	4.5	15.8	Upgrade surveillance system	18210	\$1,300
2006	7	LA	10	30.7	48.3	Install cctv and other communication systems	120761	\$6,900
2006	7	LA	5	45.6	88.6	Install cctv and other communication systems	12077	\$5,700
2007	7	LA	5	3.7	4.3	Add N/B auxiliary lane from Rosecrans to Norwalk		\$3,000
2007	7	LA	5	4.4	4.8	Add N/B auxiliary lane from Norwalk to San Antonio/Union		\$2,800
2007	7	LA	5	4.7	4.9	Add S/B auxiliary lane from San Antonio to Imperial		\$1,000
2007	7	LA	5	9.9	10.7	Add S/B auxiliary lane from Slauson to Bandini Blvd		\$2,000
2007	7	LA	5	10.8	11.5	Add S/B auxiliary lane from Bandini to Washington Blvd		\$2,000
2007	7	LA	5	12.8	12.8	Upgrade pumping station and storm drain system at Atlantic Blvd		\$1,000
2007	7	LA	10	21.69	21.69	Realign and widen W/B connector to S/B 710		\$8,000
2007	7	LA	10	28.84	28.84	Widen W/B off-ramp to Santa Anita		\$1,500
2007	7	LA	10	R13.67	R13.67	Realign and widen E/B off-ramp at Vermont		\$3,000
2007	7	LA	60	0	12	HOV lane and Aux from East LA to Rte 605		\$30,000
2007	7	LA	60	11.67		Direct HOV connector to Rte 605 HOV lane		\$7,000
2007	7	LA	60	22.8	21.6	Add auxiliary lane from Brea Canyon to Fairway		\$3,000
2007	7	LA	60	15.8		Add additional lane @ Hacienda off-ramp		\$1,000
2007	7	LA	60	8.6	7.9	Add auxiliary lane from San Gabriel to Paramount		\$3,000
2007	7	LA	60	18.1	19.3	Add E/B auxiliary lane from Azusa to Fullerton		\$3,000
2007	7	LA	91	R5.10	R5.20	Realign and widen W/B 91 to N/B 605 across Studebaker Road		\$4,000
2007	7	LA	101	2.42	2.42	Realign and widen N/B on-ramp at Glendale Blvd.		\$3,000
2007	7	LA	101	3.64	3.64	Realign and widen N/B off-ramp at Silver Lake		\$3,000
2007	7	LA	101	5.9	6.3	Add N/B auxiliary lane from Western to Sunset Blvd		\$6,000
2007	7	LA	101	5.9	6.1	Add S/B auxiliary lane from Western to Sunset Blvd		\$4,000
2007	7	LA	105	13		Add Auxiliary lane from N/B 710 on-ramp to Jct 105/710		\$5,000
2007	7	LA	105	14.57	15.66	Add auxiliary lane from Paramount to Lakewood		\$4,000
2007	7	LA	605	21.2	21.9	Auxiliary lane Ramona to Lower Azusa		\$1,000
2007	7	LA	710	21.65	22.15	Reconstruct Atlantic/Bandini Interchange for adequate truck turns		\$4,000
2007	7	LA	710	22.58	23.13	Add S/B auxiliary lane from SB 5 Connector to Washington Blvd.		\$3,000
2008	7	LA	5	5.3	6.2	Add N/B auxiliary lane Pioneer to Florence Avenue		\$2,000
2008	7	LA	5	6.2	6.52	Add N/B auxiliary lane from Florence to Rte. 605 Connector Off		\$3,000
2008	7	LA	5	9.78		Reconfigure intersection, add additional lane for N/B Slauson off-ramp		\$1,500
2008	7	LA	5	11.04	11.04	Widen Simons UP, upgrade pumping station and storm drain system		\$3,000
2008	7	LA	5	14.8	15.1	Add N/B auxiliary lane from Ditman to Calzona		\$5,000
2008	7	LA	10	31.2	31.2	Realign and widen connectors at the I-605 Interchange		\$10,000

FY	DIST	COUNTY	ROUTE	ВК РМ	AHD PM	PROJECT DESCRIPTION	EA	CAPITAL COST (\$1,000)
2008	7	LA	10	R3.42	R4.10	Add W/B auxiliary lane from Cloverfield to Centinela		\$2,000
2008	7	LA	10	R3.43	R3.43	Realign and widen W/B off-ramp at Cloverfield		\$2,000
2008	7	LA	60	12.7	14.2	Truck lane from Crossroad to 7th Ave.		\$3,000
2008	7	LA	60	21.7	22.8	Add auxiliary lane from Fairway to Brea Canyon		\$3,000
2008	7	LA	60	21.3	20.6	Add auxiliary lane from Fairway to Nogales		\$2,000
2008	7	LA	60	9.4	8.7	Add auxiliary lane from Rosemead to San Gabriel		\$3,000
2008	7	LA	60	18.15	18.15	Widen W/B off-ramp to Azusa		\$3,000
2008	7	LA	60	20.6	R21.30	Add W/B auxiliary lane from Nogales to Fairway		\$5,000
2008	7	LA	101	1.4	2.4	Add N/B auxiliary lane from Grand Avenue to Echo Park		\$2,000
2008	7	LA	101	3.9	4.3	Add N/B auxiliary lane from Silverlake to Vermont		\$3,000
2008	7	LA	105	4.2	4.7	Add W/B auxiliary lane Crenshaw off to Crenshaw on		\$3,000
2008	7	LA	105	9.6	9.8	Add E/B auxiliary lane from Wilmington off to Wilmington on		\$2,000
2008	7	LA	110	25.5	25.5	Reconstruct N/B 110 to N/B 5 connector		\$14,000
2008	7	LA	405	15.43		Add additional lane @ Crenshaw off-ramp		\$2,000
2008	7	LA	405	17.6	18.4	Add N/B auxiliary lane from Rte 107 to Inglewood		\$2,000
2008	7	LA	405	18.43	19.08	Add N/B auxiliary lane from Inglewood to Rosecrans		\$2,000
2008	7	LA	605	R10.02	R10.50	Widen E/B Telegraph and provide separate lane for off-ramp		\$6,000
2008	7	LA	605	22.4	23.2	Auxiliary lane Lower Azusa to Live Oak		\$1,200
2008	7	LA	605	23.3	22.3	Auxiliary lane Live Oak to Lower Azusa		\$1,500
2008	7	LA	605	21.9		Auxiliary lane Lower Azusa to Ramona		\$2,500
2008	7	LA	605	19.2	17.6	Auxiliary lane Valley to Rte 60 W/B		\$2,400
2008	7	LA	605	R4.72	R4.72	Realign and construct N/B 605 connector to W/B 91		\$6,000
2008	7	LA	605	R5.28	R5.28	Reconstruct S/B 605 to W/B 91 for larger radius		\$4,000
2008	7	LA	605	9.35	9.94	Add additional lanes for the lane drop		\$2,800
2008	7	LA	710	10.69		Widen Del Amo E/B on-ramp		\$2,000
2008	7	LA	710	22.45	23.28	Construct viaducts for N/B 710 to S/B 5 and S/B 710 to N/B 5		\$20,000
2009	7	LA	2	12.75	12.75	Realign and widen freeway terminus at Glendale and Alvarado Blvd		\$2,000
2009	7	LA	5	8.3	8.9	Add N/B auxiliary lane from N/B 19 to Paramount Blvd		\$2,000
2009	7	LA	5	8.4	8.9	Add S/B auxiliary lane from Lakewood to Paramount		\$2,000
2009	7	LA	5	15.1	14.8	Add S/B auxiliary lane from Calzona to Ditman		\$5,000
2009	7	LA	60	18.1	19.3	Remove HOV bypass or add additional lane at Azusa and Fullerton		\$800
2009	7	LA	60	19.6	20.3	Add auxiliary lane from Fullerton to Nogales		\$3,000
2009	7	LA	60	20.3	19.6	Add auxiliary lane from Nogales to Fullerton		\$2,000
2009	7	LA	60	R0.89	R0.89	Realign and widen E/B 60 connector to S/B 710		\$10,000

FY	DIST	COUNTY	ROUTE	ВК РМ	AHD PM	PROJECT DESCRIPTION	EA	CAPITAL COST (\$1,000)
2009	7	LA	91	R8.44	R8.63	Widen W/B off-ramp at Central Avenue		\$2,000
2009	7	LA	91	R9.16	R9.29	Widen W/B off-ramp at Wilmington Avenue		\$2,000
2009	7	LA	101	2.4	2.7	Add N/B auxiliary lane from Echo Park to Alvarado		\$2,000
2009	7	LA	101	5.11	5.11	Realign and widen N/B on-ramp at Normandie		\$4,000
2009	7	LA	105	4.5	4.9	Add W/B auxiliary lane from Crenshaw on to Crenshaw off		\$3,000
2009	7	LA	105	11.4	11.8	Add W/B auxiliary lane Long Beach on to Long Beach off		\$3,000
2009	7	LA	110	25.5	25.5	Construct N/B 110 to S/B 5 direct connector		\$40,000
2009	7	LA	170	R14.60	R14.60	Construct S/B 170 to N/B 101 2-lane direct connector		\$10,000
2009	7	LA	605	16.5	16.7	Auxiliary lane Peck to Beverly/Rose Hills		\$1,500
2009	7	LA	710	13.83		Widen Alondra S/B on-ramp		\$2,000
2009	7	LA	710	16.9	22.45	Add additional lane from Imperial to Washington		\$8,100
2009	7	LA	710	22.53		Widen Washington S/B on-ramp		\$2,000
2010	7	LA	2	15.14	15.14	Realign and widen W/B 2 connector to S/B 5		\$5,000
2010	7	LA	60	20.5	21.3	Add auxiliary lane from Nogales to Fairway		\$3,000
2010	7	LA	60	R21.70	R22.80	Add W/B auxiliary lane from Fairway to Brea Canyon Road		\$3,000
2010	7	LA	60	R3.14	R3.14	Realign and widen W/B 60 connector to I-710		\$8,000
2010	7	LA	91	R5.10	R5.10	Realign and widen E/B 91 connector to N/B 605		\$9,000
2010	7	LA	91	R6.85	R6.85	Widen W/B 91 connector to NB 110 and provide exclusive N/B lane		\$3,000
2010	7	LA	101	12	12.7	Add N/B auxiliary lane from Tajunga to Laurel Canyon		\$3,000
2010	7	LA	101	13	13.8	Add N/B auxiliary lane from Laurel Canyon to Coldwater		\$3,000
2010	7	LA	101	13.1	13.8	Add S/B auxiliary lane from Laurel Canyon to Coldwater		\$3,000
2010	7	LA	101	14	14.8	Add N/B auxiliary lane from Coldwater to Woodman		\$3,000
2010	7	LA	101	14	14.8	Add S/B auxiliary lane from Coldwater to Woodman		\$3,000
2010	7	LA	101	14.8	15.9	Add N/B auxiliary lane from Woodman to Van Nuys		\$3,000
2010	7	LA	101	14.8	15.9	Add S/B auxiliary lane from Woodman to Van Nuys		\$3,000
2010	7	LA	101	16.72	16.72	Widen N/B off-ramp to Sepulveda Blvd		\$2,000
2010	7	LA	101	18.5	18.5	Construct N/B on-ramp from Havenhurst		\$2,000
2010	7	LA	101	18.5	18.5	Construct S/B off-ramp to Havenhurst		\$2,000
2010	7	LA	101	18.5	18.5	Widen N/B off-ramp to Havenhurst Avenue		\$2,000
2010	7	LA	105	8.7	9.2	Add E/B auxiliary lane from Central off to Central on		\$3,000
2010	7	LA	110	28.7	29.2	Add auxiliary lane from Marmion to Ave 60		\$2,000
2010	7	LA	134	R6.96	R6.96	Realign and widen Central Ave Interchange for improved operations		\$8,000
2010	7	LA	134	R7.13	R7.13	Realign and widen Brand Blvd Interchange for better flow		\$5,000
2010	7	LA	210	R31.78	R31.78	Widen E/B off-ramp to Santa Anita		\$2,000

FY	DIST	COUNTY	ROUTE	BK PM	AHD PM	PROJECT DESCRIPTION	EA	CAPITAL COST (\$1,000)
2010	7	LA	210	R32.64	R32.64	Widen E/B off-ramp to Huntington Drive		\$2,000
2010	7	LA	605	R5.88	R5.87	Widen Alondra bridge north side to extend auxiliary lane		\$2,000
2011	7	LA	2	R18.81	R18.81	Realign and widen W/B 2 connector to W/B 134		\$5,000
2011	7	LA	101	19.2		Widen Balboa on-ramp		\$2,000
2011	7	LA	101	20.2		Widen White Oak on-ramp		\$2,000
2011	7	LA	101	22.5		Widen Tampa on-ramp		\$2,000
2011	7	LA	101	23.2		Widen Winnetka on-ramp		\$2,000
2011	7	LA	101	24.8		Widen Canoga on-ramp		\$2,000
2011	7	LA	101	25.3		Widen Topanga Canyon on-ramp		\$2,000
2011	7	LA	134	1.8	1.8	Construct S/B on-ramp @ Pass Ave		\$2,000
2011	7	LA	210	R23.00	R23.00	Widen E/B off-ramp to Lincoln Avenue		\$1,500
2011	7	LA	210	R23.91	R23.91	Widen E/B off-ramp to Mountain Street		\$1,500
2011	7	LA	210	R25.76	R25.76	Widen W/B off-ramp to Marengo		\$1,500
2011	7	LA	605	R8.35	R8.55	Widen Firestone Blvd and improve turn lanes to S/B on-ramp		\$3,000